

12<sup>th</sup> November 2009

**The Chairman,**  
**Telecom Regulatory Authority of India**  
Mahanagar Door Sanchar Bhavan,  
Jawahar Lal Nehru Marg, (Opposite Ram Lila Ground),  
New Delhi 110002

**Kind Attention: Dr. J S Sarma**

Dear Sir,

**Sub: Intel Corporation response to TRAI Consultation Paper on `Overall Spectrum Management and review of license terms and conditions` dated 16th October 2009**

Intel Corporation welcomes the opportunity to respond to the Telecom Regulatory Authority of India's (TRAI) Consultation Paper on `Overall Spectrum Management and review of license terms and conditions`. We applaud TRAI for this excellent consultation which poses several important questions.

Intel Corporation is the world's largest semiconductor manufacturer and a leader in technical innovation. Intel is also a leading manufacturer of communications and networking chips and equipment.

Our response to the consultation issues is enclosed below for your kind consideration and onward consideration.

We would be pleased to provide you with any additional information that you may need and would certainly welcome the opportunity to discuss the matters in person and clarify any queries that may arise.

We are available for discussions in taking some of these recommendations forward.

Yours Sincerely,

for Intel Technology India Pvt Ltd

**Vivek Vasishtha**  
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## Chapter 1

### Spectrum requirement and availability

**1. Do you agree with the subscriber base projections? If not, please provide the reasons for disagreement and your projection estimates along with their basis?**

Although Intel does not have any comment on the exact projections provided, we do realize that India has had explosive subscriber growth and concur that the overall wireless subscriber base in India will continue to grow.

**2. Do you agree with the spectrum requirement projected in ¶ 1.7 to ¶1.12? Please give your assessment (service-area wise).**

Intel would like to make several comments on the spectrum requirements projected.

First, in ¶1.10, we would like to emphasize that more spectrum than the 20 MHz per operator stated will be required. For example, the WiMAX Forum suggests a MINIMUM of 30 MHz per operator. This will allow operators to take advantage of 10 MHz in a Frequency Reuse Plan of reuse 3 (i.e. 3 x 10 MHz channels). It is crucial that operators gain access to sufficient spectrum in order to enable true broadband services for India's consumers and businesses.

Second, in ¶1.11, we would like to note that other technologies are capable of utilizing the 700 MHz frequency band. Therefore, we strongly urge TRAI to ensure that any recommendations regarding the use of this band are technology neutral rather than focused on a single technology.

Finally, we would like to note that over time, many of these frequencies will be able to be better used by newer and more efficient technologies. Therefore, we urge TRAI to enable spectrum allocations for broad range of services, rather than limiting access to the band to certain generations of technologies. As TRAI notes, some of the existing "2G" spectrum bands are likely to be re-farmed for use by newer technologies. To the extent that spectrum licenses are allocated for a technology neutral, wide-range of services, rather than limited to a single technology or service, India's consumers will be better served.

**3. How can the spectrum required for Telecommunication purposes and currently available with the Government agencies be re-farmed?**

We concur with TRAI that substantial amounts of spectrum must be made available for commercial purposes in the next 5 years. Some countries are already making hundreds of MHz of new spectrum below 4 GHz available for mobile broadband. It is important that India not fall behind, given the importance of broadband for citizens as well as the Indian economy.

The first step in refarming is to identify which spectrum is appropriate for refarming. Consideration must be given to which bands should be vacated for new commercial uses as well as which bands would be appropriate for moving the services to be refarmed. We urge the Indian government to begin work on identifying which spectrum bands might be well-suited for refarming.

One of the most successful methods for refarming spectrum has been to ensure that government agencies receive sufficient funding to be successfully relocated to different spectrum. For example, the government agencies could identify the total costs of vacating relevant spectrum bands and moving to a new spectrum band. This total cost of moving to a new band could then be the reserve price for the auction. If the reserve price is met or exceeded, the government agency would receive the funds required to vacate the spectrum and the residual funds above the reserve price would be available for general revenues. If the reserve price is not met, then the government agency would retain their existing spectrum allocation.

**4. In view of the policy of technology and service neutrality licences, should any restriction be placed on these bands (800,900 and 1800 MHz) for providing a specific service and secondly, after the expiry of present licences, how will the spectrum in the 800/900 MHz band be assigned to the operators?**

Intel strongly supports technology neutrality. Therefore, we believe that any restrictions should be as minimal as possible and primarily related to protecting adjacent services rather than require those licensees to provide a specific service. We believe that market forces will determine the highest value use for the spectrum.

**5. How and when should spectrum in 700 MHz band be allocated between competitive services?**

We believe that the spectrum should be made available in a flexible manner as expeditiously as possible. We strongly support technology neutral licenses. For example, either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD) should be allowed. We also believe that sufficiently large blocks of spectrum should be made available, rather than limit service providers to small slivers of spectrum to deploy networks.

**6. What is the impact of digital dividend on 3G and BWA?**

TRAI has rightly identified the need for additional spectrum for wireless broadband services and the fact that digital dividend spectrum is an important component of providing much-needed broadband services for India's consumers and its corresponding impact on India's economy. We believe that 3G and BWA service providers will be highly interested in acquiring digital dividend spectrum

licenses due to propagation characteristics and their impact on network costs. Therefore, TRAI should promote spectrum allocation processes that allow the service providers/ technologies to compete in the marketplace, rather than pre-ordain “winners and losers” by limiting flexibility in the licenses. As we stated in our response to question 5 above, we believe that flexibility should include duplex method, choice of technologies, and amount of spectrum.

## **Chapter 2 Licensing issues**

**7. Should the spectrum be delinked from the UAS Licence? Please provide the reasons for your response.**

Yes, spectrum licenses should be delinked from the UAS Licence. If possible, UAS licences should not be required or should be provided free (or at some nominal fee) to applicants.

**8. In case it is decided not to delink spectrum from UAS license, then should there be a limit on minimum and maximum number of access service providers in a service area? If yes, what should be the number of operators?**

Market based forces should determine the number of access service providers in a service area, rather than placing a limit on the number of service providers which could receive a licence.

**9. What should be the considerations to determine maximum spectrum per entity?**

The maximum amount of spectrum per entity should be limited only subject to anti-competition concerns.

**10. Is there a need to put a limit on the maximum spectrum one licensee can hold? If yes, then what should be the limit? Should operators having more than the maximum limit, if determined, be assigned any more spectrum?**

As stated in our response to question 9 above, the maximum amount of spectrum should be limited only subject to anti-competition concerns.

**11. If an existing licensee has more spectrum than the specified limit, then how should this spectrum be treated? Should such spectrum be taken back or should it be subjected to higher charging regime?**

Given the large number of service providers currently competing for the limited amount of spectrum available and the explosive growth of the market in India, it seems unlikely that any operator has been able to amass “too much” spectrum.

We believe that spectrum allocation policies should enable operators to access sufficient spectrum to meet their business needs. In cases where demand for spectrum exceeds supply, auctions which enable operators to acquire sufficient spectrum should be held. If there are too many spectrum licence blocks or stringent spectrum caps, the impact will be that operators have access to “too little” spectrum which will limit their ability to provide high-quality, affordable broadband.

**12. In the event fresh licences are to be granted, what should be the Entry fee for the license?**

Any licence fees should reflect administrative costs only. In cases where demand for spectrum exceeds supply, spectrum costs should be determined by auctions.

**13. In case it is decided that the spectrum is to be delinked from the license then what should be the entry fee for such a Licence and should there be any roll out condition?**

If spectrum is delinked from the licence, then provisions will need to be made to ensure that any new entrants are not subject to unfair entry fees and roll out conditions given that existing licences were granted with spectrum assignment. There need to be provisions in place to ensure that there is a totally level playing field with the same conditions for new entrants so that incumbents who received spectrum under the former licensing regime are not unduly favored.

**14. Is there a need to do spectrum audit? If it is found in the audit that an operator is not using the spectrum efficiently what is the suggested course of action? Can penalties be imposed?**

In general, Intel believes that market forces can best enable spectrum to be utilized efficiently. By allowing flexible licenses and secondary trading, there are market incentives to make sure that the spectrum is being used by the highest-value service.

**15. Can spectrum be assigned based on metro, urban and rural areas separately? If yes, what issues do you foresee in this method?**

Intel prefers nationwide licenses or the ability to aggregate regional licences to form nationwide licences. If spectrum is assigned on the basis of numerous geographical subsets, there is increased risk of interference or the need for network coordination. Additionally, there is a negative impact on the ability of an operator to provide national coverage as well as to create agreements with roaming partners.

**16. Since the amount of spectrum and the investment required for its utilisation in metro and large cities is higher than in rural areas, can asymmetric pricing of telecom services be a feasible proposition?**

Market forces are the best mechanism to determine the pricing of telecom services as well as the price for spectrum licences. One possibility would be to make some nationwide licences or large geographic areas available, along with some spectrum in smaller blocks available for metro or regional licenses. Then service providers can bid for nationwide licenses but still have the ability to acquire additional capacity in select areas.

**M&A issues**

Intel agrees that the “merger of licenses, and transfer/merger/sharing of assigned spectrum among licensees provides an important method of consolidation of spectrum” Therefore, we concur with TRAI that it “would be appropriate to revisit the present policies (e.g. M&A guidelines, lock-in of promoter equity, etc.) in line with the future requirement.” We believe that mergers and acquisitions are an important part of market forces which can improve efficiency and utilization of resources. Anti-competitive and monopoly concerns as well as spectrum caps can be reviewed as appropriate by the relevant body in India.

Intel does not have any specific responses to the questions (17-23) raised in this section.

**Spectrum Trading**

**24. Is spectrum trading required to encourage spectrum consolidation and improve spectrum utilization efficiency?**

Intel concurs with TRAI that spectrum trading “will only take place if the spectrum is worth more to the new user than it was to the former user, reflecting the greater economic benefit the new user expects to drive from its use. The spectrum trading may permit faster rollout/expansion of the networks. This in turn is likely to boost market competition.” Given the tremendous explosion of wireless growth in India, the limited amount of spectrum available to operators, and the potential benefits to Indian consumers, Intel believes that spectrum trading should be permitted. We strongly support market-based mechanisms that will allow operators to acquire sufficient spectrum to enable high-speed, affordable broadband.

**25. Who all should be permitted to trade the spectrum?**

Given the serious scarcity of spectrum available in India, as many licence holders as possible should be permitted to trade spectrum in order to facilitate utilizing spectrum for the highest value use. Spectrum trading can be an important tool

which can allow operators to acquire access to sufficient spectrum for a viable business model and increased efficiency.

**26. Should the original allottee who has failed to fulfill “Roll out obligations” be allowed to do spectrum trading?**

Intel has no response to this specific question.

**27. Should transfer charges be levied in case of spectrum trading?**

Intel believes that getting the spectrum into the mostly highly valued use will provide great benefits to Indian consumers rather than determining any calculated transfer charge. If transfer charges are levied in cases of spectrum trading, then the best method would be for the government to prescribe a modest percentage of the spectrum trading charges per MHz. Market forces would define the actual value of the spectrum being traded and the government would charge a certain percentage of that value as the transfer charge.

**28. What should be the parameters and methodology to determine first time spectrum transfer charges payable to Government for trading of the spectrum? How should these charges be determined year after year?**

If the Government does decide to require spectrum transfer charges, then it is important that the process for determining these charges be completed quickly, be transparent, and equitable. Lengthy delays in determining the amount or setting the fee too high will discourage any spectrum trading, with the resultant negative impacts on spectrum availability and deployments.

**29. Should such capping be limited to 2G spectrum only or consider other bands of spectrum also? Give your suggestions with justification.**

Any spectrum caps should be subject only to anti-competitive concerns. Given the scarcity of spectrum available in the India, it is crucial that operators have access to sufficient spectrum for a viable business model. For example, the WiMAX Forum has stated the minimum spectrum requirement is 30 MHz per operator. Market forces should be allowed in order to allow operators access to additional spectrum.

**30. Should size of minimum tradable block of spectrum be defined or left to the market forces?**

The size of the block of spectrum to be traded should be left to market forces. As TRAI stated the trade “will only take place if the spectrum is worth more to the new user than it was to the former user, reflecting the greater economic benefit the new user expects to drive from its use.”

**31. Should the cost of spectrum trading be more than the spectrum assignment cost?**

The cost of spectrum trading should be left to market forces.

**Spectrum sharing**

Intel supports regulatory mechanisms that allow market forces to facilitate the deployment of high-quality, affordable broadband services. We welcome attempts by TRAI to develop spectrum sharing policies that support these goals. However, we do not believe that spectrum sharing should have precedence over improvements in Mergers & Acquisitions, spectrum trading, or the availability of additional spectrum.

Intel does not have any specific responses to the questions (32-36) raised in this section.

**Perpetuity of licences**

**37. Should there be a time limit on licence or should it be perpetual?**

If India decides to continue to have Universal Access Service licences, these licences should be granted for a small fee (such as covering administrative costs only) and have no time limit.

**38. What should be the validity period of assigned spectrum in case it is delinked from the licence? 20 years, as it exists, or any other period**

If spectrum is delinked from the licence, the rights to the spectrum should be valid for a lengthy period (e.g. 15 or 20 years) with the right of renewal.

**39. What should be the validity period of spectrum if spectrum is allocated for a different technology under the same license midway during the life of the license?**

Intel strongly supports technology neutrality and therefore believes that licences should be allocated in a flexible manner that would allow the spectrum to be utilized by a different technology without a change in the licence terms.

**40. If the spectrum assignment is for a defined period, then for what period and at what price should the extension of assigned spectrum be done?**

If the spectrum is assigned based upon market based mechanisms such as auctions, the bidders will take the opportunity to renew spectrum licences into account when they participate in the auction.

**41. If the spectrum assignment is for a defined period, then after the expiry of the period should the same holder/licensee be given the first priority?**

If the spectrum has been assigned with the right to renew, then the same holder/licensee will have first priority. New licenses should be granted for long periods, with right of renewal, and flexible licensing conditions.

**Uniform License Fee**

Intel has no comments on this section.

**Chapter 3  
Spectrum assignment**

Intel supports market-based mechanisms. Therefore, in cases where demand for spectrum outstrips supply, licences should be granted utilizing auctions.

Intel does not have any specific responses to the questions (45-50) raised in this section.

**Assignment of spectrum other than 800, 900 and 1800 MHz**

**51. In your opinion, what should be the method of assigning spectrum in bands other than 800, 900 and 1800 MHz for use other than commercial?**

In cases where the spectrum required for non-commercial use does not have competing demand, it can be assigned on a first-come, first served basis. In cases where the spectrum is required for public safety or for strategic functions in bands of high interest for commercial deployment, then it may be desirable to have these services relocated to other spectrum bands (see our response to question 3 for more information on this process).

**Spectrum pricing**

Intel has no specific comments on questions in this section. However, we do note that to the extent that new spectrum (including future tranches) should be made available based upon market-based mechanisms such as auctions. For example, spectrum should not be made available for “4G” with potential licencees limited to “2G” and/or “3G” spectrum holders.

**Structure for spectrum management**

Intel has no specific comments on questions in this section.